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(54) **CAMERA ASSEMBLY AND ELECTRONIC DEVICE**

(57) The present disclosure provides a camera assembly (23) and an electronic device (100). The camera assembly (23) includes a camera module (231), a motor (232) and a transmission module (233). The transmission module (233) is connected between the camera module (231) and the motor (232). The motor (232) is configured to drive the transmission module (233) so as to drive the camera module (231) to move. The transmission module (233) defines at least one concave part (234) set on a lateral wall of the transmission module (233). Thus, an empty space may be formed above the concave part (234). In the electronic device (100), the empty space (26) may be utilized as the clearance area of the antenna radiator (27) inside the electronic device (100). Therefore, the performance of the antenna installed close to the camera module (231) may be improved.

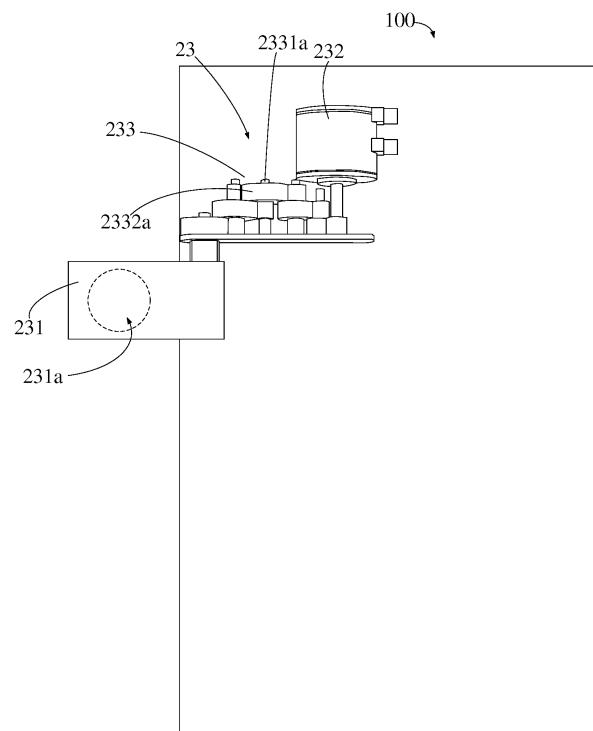


FIG. 10

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Description**TECHNICAL FIELD**

[0001] The present disclosure relates to electronic devices, and in particular to a camera assembly and an electronic device.

BACKGROUND

[0002] As the development of communication technology, mobile electronic devices such as cell phones and laptops are more and more frequently used in people's daily life.

[0003] Camera module is the main electronic component of electronic device for photographing. In prior art, the camera module installed in the electronic device may have influence on the antenna close to the camera module. Accordingly, the transmitting and receiving performance of the antenna may be degraded.

SUMMARY

[0004] The present disclosure provides a camera assembly and an electronic device in order to solve the above problem.

[0005] In an aspect, a camera assembly is provided. The camera assembly is adapted to be installed in an electronic device. The camera assembly includes: a camera module; a motor; and a transmission module connected between the camera module and the motor, wherein the motor is configured to drive the transmission module so as to drive the camera module to move, and the transmission module defines at least one concave part set on a lateral wall of the transmission module (233).

[0006] In another aspect, an electronic device is provided. The electronic device includes the above-mentioned camera assembly and an antenna radiator. The antenna radiator is located in a space defined by the concave part; or the antenna radiator is part of an outer frame of the electronic device, a clearance area is formed between the antenna radiator and the concave part; or the antenna radiator is connected to an outer frame of the electronic device, a clearance area is formed between the antenna radiator and the concave part.

[0007] According to the present disclosure, an empty space may be formed above the concave part. In the electronic device, the empty space may be utilized as the clearance area of the antenna radiator inside the electronic device. Therefore, the performance of the antenna installed close to the camera module may be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] To better describe the technical solution of this application, a brief description of all the drawings used in this application will be provided as below. Clearly these drawings below are only examples for this application.

For those skilled in the art, other drawings can be obtained based on the ones below easily without much of the creative work.

FIG. 1 is a schematic structural view of an electronic device according to an embodiment of the present disclosure.

FIG. 2 is a side view of an electronic device according to an embodiment of the present disclosure.

FIG. 3 is a schematic structural view of an electronic device according to an embodiment of the present disclosure.

FIG. 4 is a perspective view of a camera module according to an embodiment of the present disclosure.

FIG. 5 is a perspective view of a camera assembly according to an embodiment of the present disclosure.

FIG. 6 is a perspective view of a camera assembly according to another embodiment of the present disclosure.

FIG. 7 shows a first state of a camera assembly according to an embodiment of the present disclosure.

FIG. 8 shows a second state of a camera assembly according to an embodiment of the present disclosure.

FIG. 9 shows a third state of a camera assembly according to an embodiment of the present disclosure.

FIG. 10 shows a fourth state of a camera assembly according to an embodiment of the present disclosure.

FIG. 11 is a schematic structural view of an installation hood according to an embodiment of the present disclosure.

FIG. 12 is a perspective view of a camera assembly according to another embodiment of the present disclosure.

FIG. 13 is a schematic structural view of an installation hood according to another embodiment of the present disclosure.

FIG. 14 is a perspective view of a camera assembly according to another embodiment of the present disclosure.

FIG. 15 is a schematic structural view of an installation hood according to another embodiment of the present disclosure.

FIG. 16 is a perspective view of a camera assembly according to another embodiment of the present disclosure.

DETAILED DESCRIPTION

[0009] Technical solutions in embodiments of the present disclosure are hereinafter described clearly with reference to accompanying drawings in embodiments of the present disclosure. Apparently, embodiments described are a part of embodiments of the present disclosure.

sure, but not all embodiments. All other embodiments obtained by those skilled in the art based on the embodiments in the present disclosure without creative labor are within the protection scope of the present disclosure.

[0010] In the specification, it is to be understood that terms such as "central", "longitudinal", "lateral", "length", "width", "thickness", "upper", "lower", "front", "rear", "left", "right", "vertical", "horizontal", "top", "bottom", "inner", "outer", "clockwise" and "counterclockwise" should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description and do not require that the present disclosure be constructed or operated in a particular orientation. In addition, terms such as "first" and "second" are used herein for purposes of description and are not intended to indicate or imply relative importance or significance or to imply the number of indicated technical features. Thus, the feature defined with "first" and "second" may comprise one or more of this feature. In the description of the present disclosure, "a plurality of" means two or more than two, unless specified otherwise.

[0011] In the present disclosure, unless specified or limited otherwise, terms "mounted", "connected", "coupled" and the like are used in a broad sense, and may include, for example, fixed connections, detachable connections, or integral connections; may also be mechanical or electrical connections; may also be direct connections or indirect connections via intervening structures; may also be inner communications of two elements, as can be understood by those skilled in the art depending on specific contexts.

[0012] In the present disclosure, unless specified or limited otherwise, a structure in which a first feature is "on" or "below" a second feature may include an embodiment in which the first feature is in direct contact with the second feature, and may also include an embodiment in which the first feature and the second feature are not in direct contact with each other, but are contacted via an additional feature formed therebetween. Furthermore, a first feature "on", "above" or "on top of" a second feature may include an embodiment in which the first feature is right or obliquely "on", "above" or "on top of" the second feature, or just means that the first feature is at a height higher than that of the second feature; while a first feature "below", "under" or "on bottom of" a second feature may include an embodiment in which the first feature is right or obliquely "below", "under" or "on bottom of" the second feature, or just means that the first feature is at a height lower than that of the second feature.

[0013] Various embodiments and examples are provided in the following description to implement different structures of the present disclosure. In order to simplify the present disclosure, certain elements and settings will be described. However, these elements and settings are only by way of example and are not intended to limit the present disclosure. In addition, reference numerals may be repeated in different examples in the present disclosure.

This repeating is for the purpose of simplification and clarity and does not refer to relations between different embodiments and/or settings. Furthermore, examples of different processes and materials are provided in the present disclosure. However, it would be appreciated by those skilled in the art that other processes and/or materials may be also applied.

[0014] Referring to FIG. 1, an electronic device 100 is provided according to an embodiment of the present disclosure.

[0015] The electronic device 100 may include a front case 101 and a back case 102. The front case 101 may be utilized to protect the cover plate 21, the display screen 22 and the like. The front case 101 and the back case 102 may cooperatively define an accommodating space for receiving other components such as a camera assembly 23, a circuit board 31 and a battery 32.

[0016] In some embodiments, the front case 101 and the back case 102 may be metal cases. It should be noted that, the material of the front case 101 and the back case 102 is not limited herein. For example, the front case 101 and the back case 102 may include both a plastic portion and a metal portion. Alternatively, the front case 101 and the back case 102 may be plastic cases.

[0017] The cover plate 21 may be made of glass, sapphire, plastic, etc., and may be utilized to protect the display screen 22. The cover plate 21 may prevent dust, water or oil from adhering to the display screen 22, and prevent the display screen 22 from corrosion in external environment and from damage due to external impact.

[0018] The cover plate 21 may include a display portion and a non-display portion. The display portion is transparent and correspond to the light-emitting surface of the display screen 22. The non-display portion may be opaque, which can shield the inner structure of the electronic device 100. Within the non-display portion there may be formed open holes for transmitting sound or light.

[0019] It should be understood that, the electronic device 100 may have a bezel-less structure, where the non-display portion is not arranged.

[0020] Referring to FIG. 2, the electronic device 100 may define on its outer edge a headphone hole 105, a microphone hole 106, a USB hole 107 and a loudspeaker hole 108. The headphone hole 105, the microphone hole 106, the USB hole 107 and the loudspeaker hole 108 may be through holes.

[0021] Referring to FIG. 3, the camera assembly 23 may include a camera module 231, a motor 232 and a transmission module 233. The transmission module 233 may be connected between the camera module 231 and the motor 232. The motor 232 may drive the transmission module 233 so as to drive the camera module 231 to move. The transmission module 233 may define at least one concave part 234. The concave part 234 may be located on the lateral wall of the transmission module 233.

[0022] In some embodiments, the electronic device 100 may include an antenna radiator 27 attached, ad-

hered or mounted on the inner or outer surface of one of its frames, such as the front case 101, the back case 102 or a middle frame (not shown). Alternatively, the antenna radiator 27 may not be attached to the frame but disposed inside the electronic device (e.g., be connected to the main board). In both circumstances, the antenna radiator 27 may be located in the space defined by the concave part 234 and kept distanced from the camera assembly 23. That is, the concave part 234 may be utilized to receive the antenna radiator. Thus, the function of the antenna radiator 27 may be ensured, and the compactness of the inner structure of the electronic device 100 may be improved.

[0023] In other embodiments, the antenna radiator 27 may be at least part of one frame (e.g., the front case 101, the back case 102 or a middle frame) of the electronic device 100. For example, the middle frame may be made of metal, and act as an antenna radiator 27. A feed circuit (not shown) may be disposed inside the electronic device 100 (e.g., fixed to the middle frame or the main board), and be connected with the part of the middle frame which acts as the antenna radiator 27. In this situation, the existence of the concave part 234 may increase the distance between the antenna radiator 27 (or the frame of the electronic device) and the camera assembly 23, which may provide a clearance area for the antenna radiator 27. That is, the concave part 234 may be utilized as the clearance area of the antenna radiator 27. Therefore, the performance of the antenna radiator 27 may be improved. It should be understood by those of ordinary skill in the art, the frame (e.g., the front case 101, the back case 102 or the middle frame) may act as the antenna radiator 27 as a whole, or only part of the frame may act as the antenna radiator 27 while the other part does not. In some embodiments, the frame may include several independent antenna radiators spaced apart from each other.

[0024] Referring to FIG. 4, the camera module 231 may include only one camera. Alternatively, the camera module 231 may include two cameras. The camera module 231 may further include a camera and a flash. In this embodiment, the camera module 231 may include a lens 2311 and a chassis 2312. The lens 2311 may have a photographing surface 231a. The lens 2311 may be installed on the chassis 2312. In other embodiments, there may also be integrated a flash and a sound receiver on the chassis 2312.

[0025] Referring to FIG. 5, the transmission module 233 may include a rotating-shaft group 2331 and a gear group 2332. The rotating-shaft group 2331 may include a number of rotating shafts 2331a. The rotating shafts 2331a may connect the motor 232 and the camera module 231. The gear group 2332 may include a number of gears 2332a. The gears 2332a may be set on the rotating shafts 2331a. The gears 2332a may engage with each other. The motor 232 may drive the rotating shafts 2331a and the gears 2332a to rotate so as to drive the camera module 231 to move.

[0026] The rotating shafts 2331a may include a driving shaft 2331b, at least one intermediate shaft 2331c and a driven shaft 2331d. The driving shaft 2331b may connect to the motor 232. The driven shaft 2331d may connect to the camera module 231.

[0027] In some embodiments, the multiple rotating shafts 2331a may be set in parallel.

[0028] In some embodiments, the camera module 231 may be fixed to the driven shaft 2331. The camera module 231 may rotate around the driven shaft 2331d.

[0029] The gears 2332a may include a driving gear 2332b, at least one intermediate gear 2332c and a driven gear 2332d. The driving gear 2332b may set on the driving shaft 2331b. The intermediate gear 2332c may be set on the intermediate shaft 2331c. The driven gear 2332d may be set on the driven gear 2331d.

[0030] The gears 2332a may include at least one step part 2341. The step part 2341 may be set corresponding to the concave part 234. The step part 2341 may be set at a side of the gear 2332a far away from the camera module 231, wherein said gear 2332a is set on the rotating shaft 2331a connecting to the camera module 231. The step part 2341 may be set on the surface of the gear 2332a far away from the camera module 231, wherein said gear 2332a is set on the rotating shaft 2331a connecting to the camera module 231. That is, the step part 2341 may be located on the surface of the driven gear 2332d far away from the camera module 231.

[0031] In order to clearly describe the structure, the top surface of each of these components is defined as the surface facing towards the motor 232, and the bottom surface of each of these components is defined as the surface facing towards the camera module 231.

[0032] The top surface of the driven gear 2332d and the top surface of the adjacent intermediate gear 2332c may be staggered such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0033] In some embodiments, referring to FIG. 5, the top surface of the driven gear 2332d may be engaged with the bottom surface of the adjacent intermediate gear 2332c, such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0034] In some embodiments, each rotating shaft 2331a may include a first end 2331e and a second end 2331f oppositely arranged. The first end 2331e of each rotating shaft 2331a may face towards the motor 232 while the second end 2331f of each rotating shaft 2331a may face towards the camera module 231.

[0035] The top surface of the first end 2331e of the driven shaft 2331d may be located between the top surface of the driven gear 2332d and the top surface of the intermediate gear 2332c adjacent to the driven gear 2332d, such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The emp-

ty space 26 may be used as the clearance area of an antenna radiator 27.

[0036] In some embodiments, the top surface of the first end 2331e of the driven shaft 2331d may be located in the same plane as the top surface of the driven gear 2332d, such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0037] In some embodiments, the distance D1 from the bottom surface of the second end 2331f of the driven shaft 2331d to the top surface of the driven gear 2332d may be less than the distance D2 from the bottom surface of the second end 2331f of the driven shaft 2331d to the top surface of the intermediate gear 2332c adjacent to the driven gear 2332d, such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0038] In some embodiments, as shown in FIG. 6, the top surface of the driven gear 2332d may be located between the top surface and the bottom surface of the adjacent intermediate gear 2332c, such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0039] Please refer to FIGs. 7-8. In FIG. 7, the camera module 231 is in a first position. The photographing surface 231a of the camera module 231 may face towards a first direction. After the motor 232 drives the rotating shafts 2331a and the gears 2332a to rotate, as shown in FIG. 8, the camera module 231 changes into a second position. In this situation, the photographing surface 231a of the camera module 231 may still face the first direction. In other words, the camera assembly may be utilized for photographing towards the same direction but at different position.

[0040] Please refer to FIGs. 9-10. In FIG. 9, the camera module 231 is in a first position. The photographing surface 231a of the camera module 231 may face towards a first direction. After the motor 232 drives the rotating shafts 2331a and the gears 2332a to rotate, as shown in FIG. 10, the camera module 231 changes into a second position. In this situation, the photographing surface 231a of the camera module 231 may face a second direction opposite to the first direction. In other embodiments, there may exist an angle of 45°, 90°, 120° and the like between the first direction and the second direction. The angle can be acquired by controlling the motor 232 to rotate based on design requirement.

[0041] In other embodiments, the motor 232 may drive the transmission module in order to push the camera module 231 outside or to pull the camera module 231 back.

[0042] Referring to FIG. 5, the camera assembly 23 may further include an installation plate 24. The transmission module 233 may be installed on the installation plate 24. The motor 232 and the transmission module

233 may be located at one side of the installation plate 24 while the camera module 231 may be located at the other side of the installation plate 24.

[0043] In this embodiment, the rotating shafts 2331a may be installed on the installation plate 24. Each rotating shaft 2331a may be substantially perpendicular to the installation plate 24. The second end 2331f of each of the driving shaft 2331b and the intermediate shafts 2331c may be connected to the installation plate 24. The driven shaft 2331d may penetrate and connect to the installation plate 24. The first end 2331e of the driven shaft 2331d may be located at the same side of the installation plate 24 as the driving shaft 2331b and the intermediate shafts 2331c. The second end 2331f of the driven shaft 2331d may be located at the other side of the installation plate 24 opposite to the driving shaft 2331b and the intermediate shafts 2331c. The gears 2332a and the motor 232 may be located at the same side of the installation plate 24 as the driving shaft 2331b and the intermediate shafts 2331c. The camera module 231 may be located at the other side of the installation plate 24 opposite to the driving shaft 2331b and the intermediate shafts 2331c.

[0044] In some embodiments, the distance D3 from the top surface of the driven gear 2332d to the installation plate 24 may be less than the distance D4 from the top surface of the intermediate gear 2332c adjacent to the driven gear 2332d to the installation plate, such that an empty space 26 may be formed above the top surface of the driven gear 2332d. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0045] Referring to FIGs. 11-12, in some embodiments, the camera assembly may further include an installation hood 25. The installation hood 25 may cover the transmission module 233.

[0046] The motor 232, part of the driven shaft 2331d, the installation plate 24 and the camera module 231 may be located outside the installation hood 25. The installation hood 25 may be fixed to the installation plate 24. The installation hood 25 may include several protrusions 251. On each protrusion 251 there may be formed a through hole 251a for receiving a screw such that the installation hood 25 may be fixed to other components of the electronic device 100. The concave part 234 may be located at the lateral wall of the installation hood 25 to form an empty space 26. The empty space 26 may be used as the clearance area of an antenna radiator 27.

[0047] In some embodiments, referring to FIGs. 13-14, the concave part 234 may be a curved structure 234a formed on the lateral wall of the transmission module 233, which matches the shape of the electronic component disposed in the empty space 26. Thus, the manufacturing difficulty may be reduced.

[0048] In other embodiments, referring to FIGs. 15-16, the concave part 234 may be a step-shaped structure 234b formed on the lateral wall of the transmission module 233. The step-shaped structure 234b may include several step surfaces 234c which matches better the outlines of the transmission module 233. Thus, the empty

space 26 may be enlarged.

[0049] Referring to FIG. 1, the circuit board 31 may be installed in the electronic device 100. The circuit board 31 may be the main board of the electronic device 100. The circuit board 31 may be integrated with at least one of a motor 232, a microphone, a loudspeaker, a headphone jack, a USB interface, a camera module 23, a distance sensor, an environment light sensor, a sound receiver or a processor. The headphone jack may be located corresponding to the location of the headphone hole 105. The microphone may be located corresponding to the location of the microphone hole 106. The USB interface may be located corresponding to the location of the USB hole 107. The loudspeaker may be located corresponding to the location of the loudspeaker hole 108.

[0050] In some embodiments, the circuit board 31 may be fixed inside the electronic device 100. Specifically, the circuit board 31 may be fixed to the driving device 23 by screws or clips. It should be noted that the fixation method of the circuit board 31 and the driving device 23 is not limited in the present disclosure, and other method may also be employed. For example, screws and clips may both be utilized at the same time for fixation.

[0051] The battery 32 may be installed in the electronic device 100. The battery 32 may be electrically connected to the circuit board 31 so as to supply power to the electronic device 100. The back case 102 may be the battery case of the battery 32. The back case 102 may cover and protect the battery 32. Specifically, the back case 102 may cover and protect the battery 32 from damage due to collision and drop.

[0052] According to the embodiments of the camera assembly and the electronic device provided in the present disclosure. The camera assembly may include a camera module, a motor and a transmission module. The transmission module may be connected between the camera module and the motor. The motor may be utilized to drive the transmission module so as to drive the camera module to move. The transmission module may have at least one concave part. The concave part may be formed on the lateral wall of the transmission module such that an empty space may be formed above the concave part. In the electronic device, the empty space may be used as the clearance area of the antenna radiator of the electronic device. Therefore, the performance of the antenna installed close to the camera module may be improved.

Claims

1. A camera assembly (23) adapted to be installed in an electronic device (100), **characterized by**, comprising:

a camera module (231);
a motor (232); and

a transmission module (233) connected between the camera module (231) and the motor (232), wherein the motor (232) is configured to drive the transmission module (233) so as to drive the camera module (231) to move, and the transmission module (233) defines at least one concave part (234) set on a lateral wall of the transmission module (233).

2. The camera assembly (23) of claim 1, wherein the at least one concave part (234) is a curved structure (234a) formed on the lateral wall of the transmission module (233); or the at least one concave part is a step-shaped structure (234b) formed on the lateral wall of the transmission module (233).

3. The camera assembly (23) of claim 1 or claim 2, wherein the transmission module (233) comprises a rotating-shaft group (2331) and a gear group (2332); the rotating-shaft group (2331) comprises a plurality of rotating shafts (2331a) connecting the motor (232) and the camera module (231); and the gear group (2332) comprises a plurality of gears (2332a) arranged on the plurality of rotating shafts (2331a), wherein the plurality of gears (2332a) engage with each other.

4. The camera assembly (23) of claim 3, wherein the gear group (2332) comprises at least one step part (2341), the concave part (234) is located corresponding to the step part (2341), and the step part (2341) is set at a side of the plurality of gears (2332a) far away from the camera module (231).

5. The camera assembly (23) of claim 4, wherein the plurality of rotating shafts (2331a) comprise a driving shaft (2331b), at least one intermediate shaft (2331c) and a driven shaft (2331d), the driving shaft (2331b) connects to the motor (232), and the driven shaft (2331d) connects to the camera module (231); the plurality of gears (2332a) comprise a driving gear (2332b), at least one intermediate gear (2332c) and a driven gear (2332d), the driving gear (2332b) is set on the driving shaft (2331b), the at least one intermediate gear (2332c) is set on the at least one intermediate shaft (2331c), and the driven gear (2332d) is set on the driven shaft (2331d); and the step part (2341) is located at a top surface of the driven gear (2332d).

6. The camera assembly (23) of claim 5, wherein the top surface of the driven gear (2332d) is staggered with a top surface of an adjacent one of the at least one intermediate shaft (2332c).

7. The camera assembly (23) of claim 5, wherein

each of the plurality of rotating shafts (2331a) comprises a first end (2331e) and a second end (2331f) oppositely arranged, the first end (2331e) of each of the plurality of rotating shafts (2331a) faces towards the motor (232), and the second end (2331f) of each of the plurality of rotating shafts (2331a) faces towards the camera module (231);

a top surface of a first end (2331e) of the driven shaft (2331d) is located between a top surface of the driven gear (2332d) and a top surface of an adjacent one of the at least one intermediate gear (2332c).

8. The camera assembly (23) of claim 7, wherein a distance (D1) from a bottom surface of the second end (2331f) of the driven shaft (2331d) to a top surface of the driven gear (2332d) is less than a distance from a bottom surface of the second end (2331f) of the driven shaft (2331d) to a top surface of the at least one intermediate gear (2332c) adjacent to the driven gear (2332d).
9. The camera assembly (23) of claim 5, further comprising:

an installation plate (24), wherein the transmission module (233) is installed on the installation plate (24), the motor (232) and the transmission module (233) are located at one side of the installation plate (24), and the camera module (231) is located at the other side of the installation plate (24).
10. The camera assembly (23) of claim 9, wherein a distance (D3) from a top surface of the driven gear (2332d) to the installation plate (24) is less than a distance (D4) from a top surface of the at least one intermediate gear (2332c) adjacent to the driven gear (2332d) to the installation plate (24).
11. The camera assembly (23) of any one of claims 1-10, further comprising:

an installation hood (25) covering the transmission module (233), wherein the concave part (234) is located on the lateral wall of the installation hood (25).
12. The camera assembly (23) of any one of claims 1-11, wherein
the transmission module (233) is capable of driving the camera module (231) to switch between a first position and a second position, the camera module (231) is located inside the electronic device (100) when switching to the first position, and the camera module (231) is located outside the electronic device (100) when switching to the second position.
13. The camera assembly (23) of claim 12, wherein

a photographing surface (231a) of the camera module (231) faces a same direction when the camera module (231) is in the first position and the second position.

14. The camera assembly (23) of claim 12, wherein a photographing surface (231a) of the camera module (231) faces a first direction when the camera module (231) is in the first position; a photographing surface (231a) of the camera module (231) faces a second direction different from the first direction when the camera module (231) is in the second position.
15. An electronic device (100), comprising the camera assembly (23) of any one of claims 1-14 and an antenna radiator (27); wherein
the antenna radiator (27) is located in a space defined by the concave part (24); or
the antenna radiator (27) is part of an outer frame of the electronic device (100), a clearance area is formed between the antenna radiator (27) and the concave part (234); or
the antenna radiator (27) is connected to an outer frame of the electronic device (100), a clearance area is formed between the antenna radiator (27) and the concave part (234).

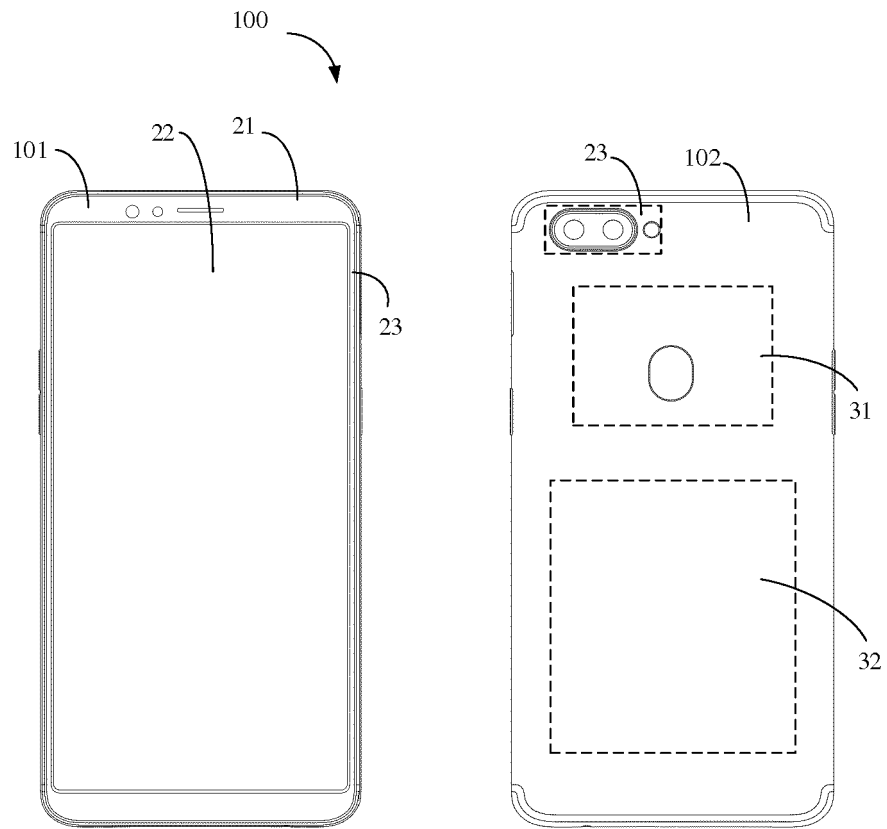


FIG. 1

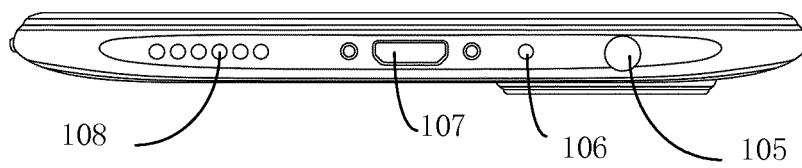


FIG. 2

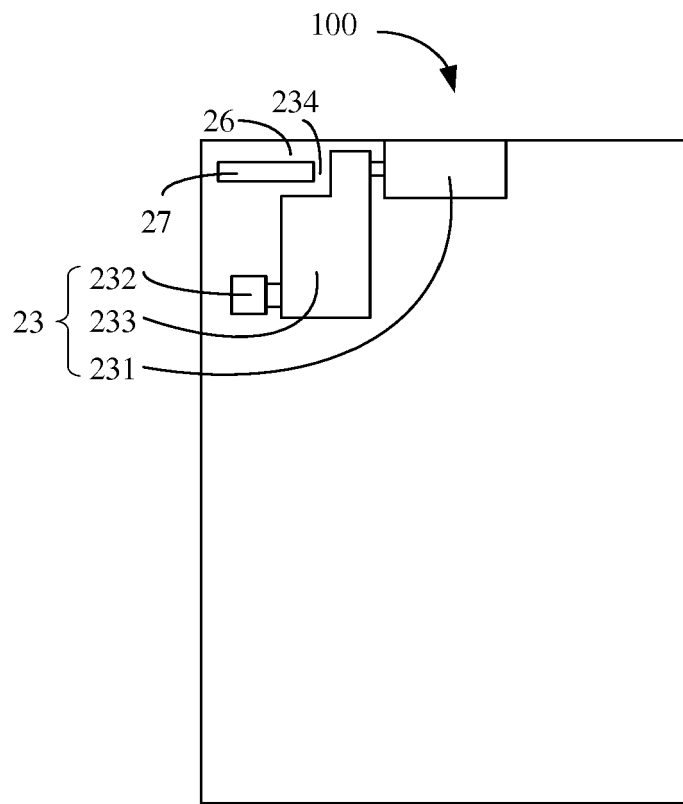


FIG. 3

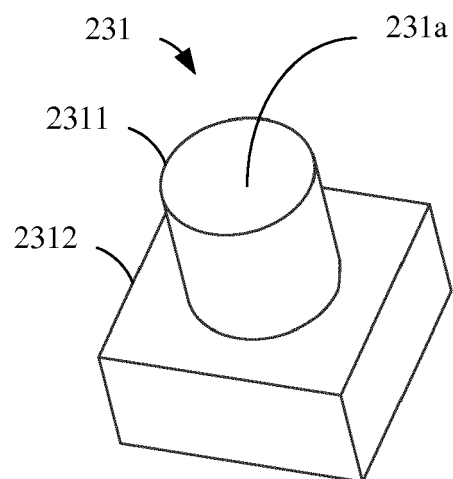


FIG. 4

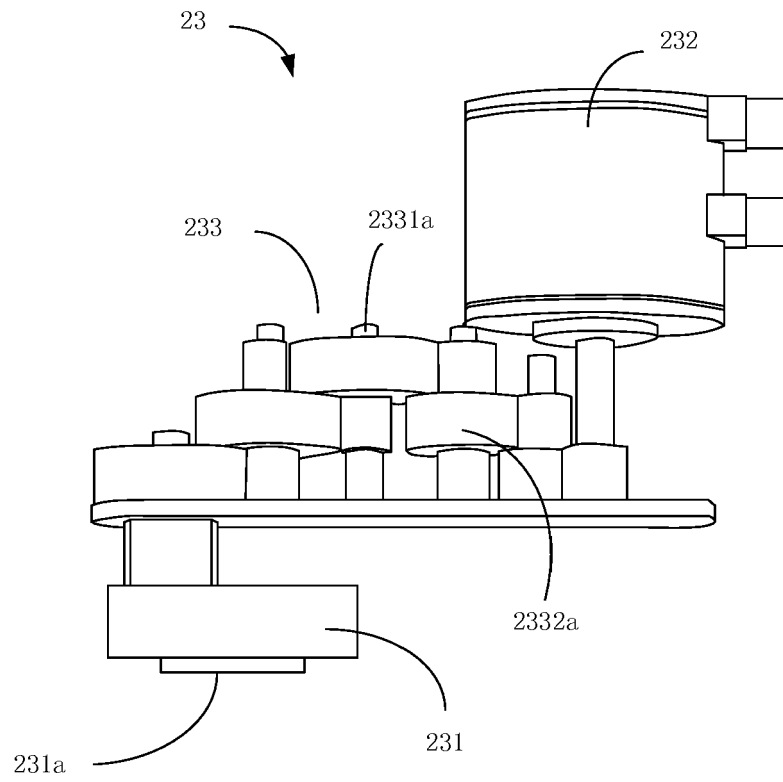


FIG. 7

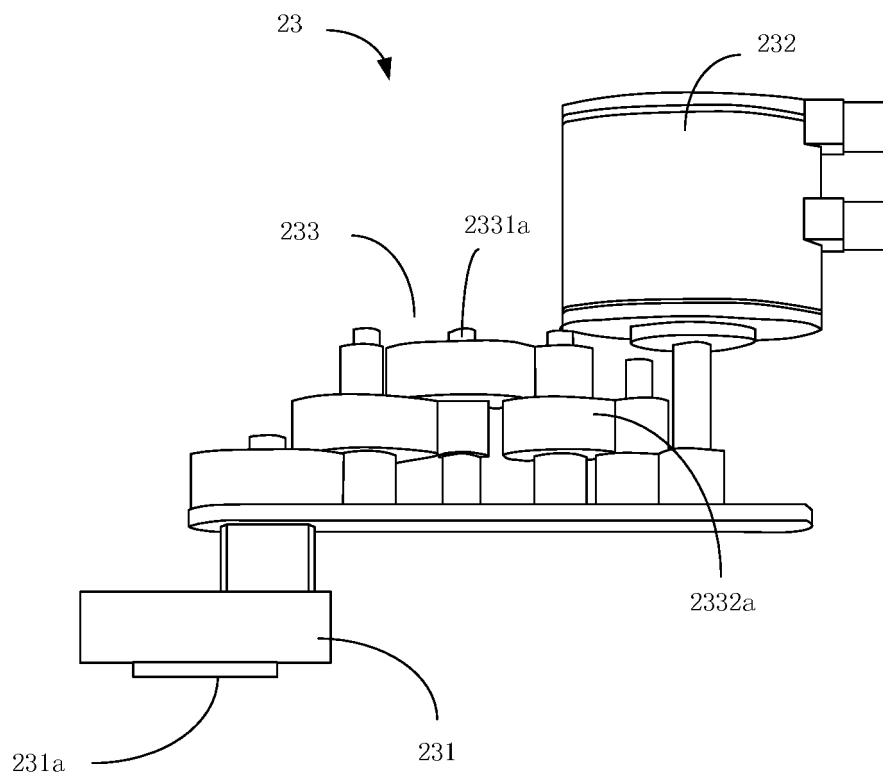


FIG. 8

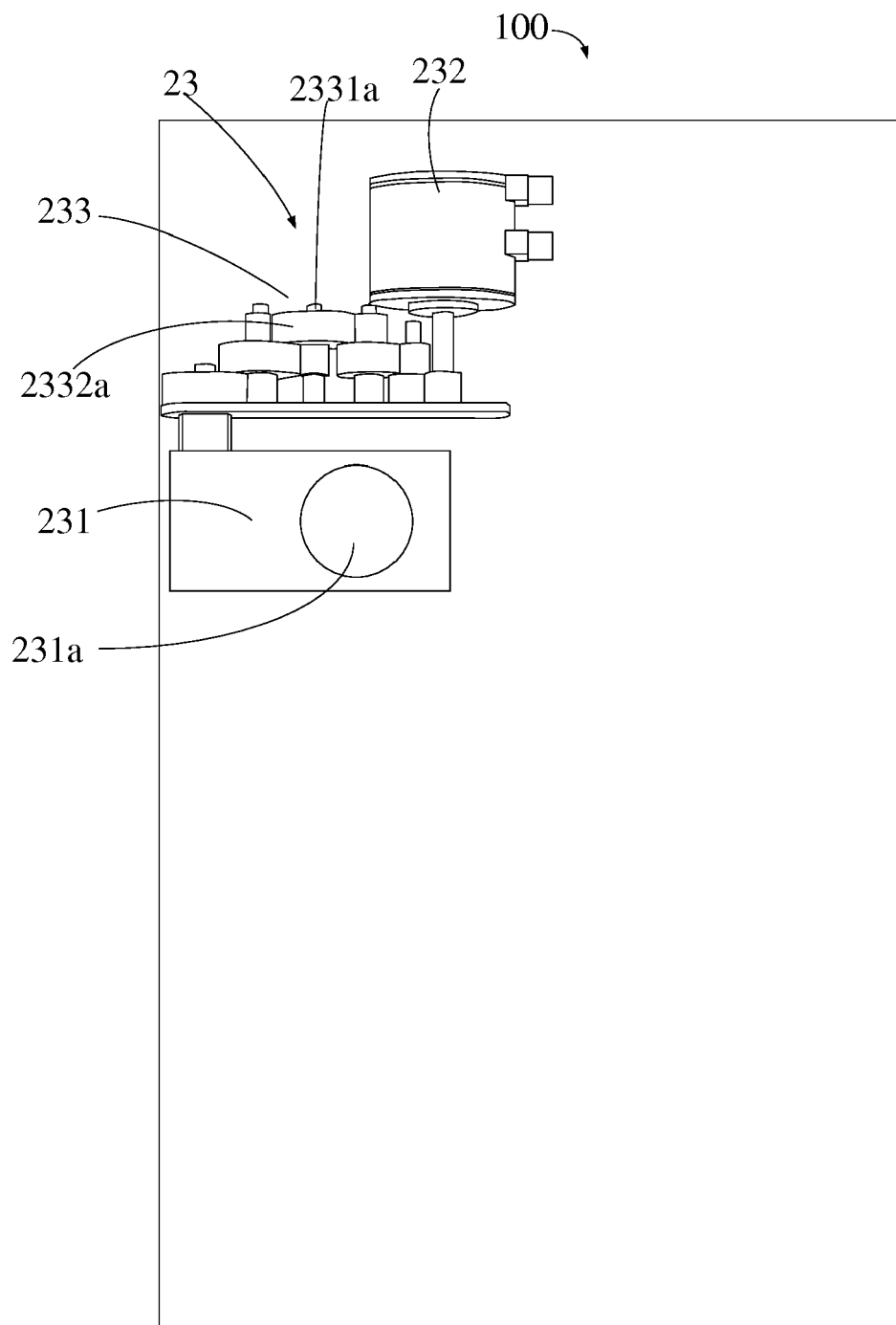


FIG. 9

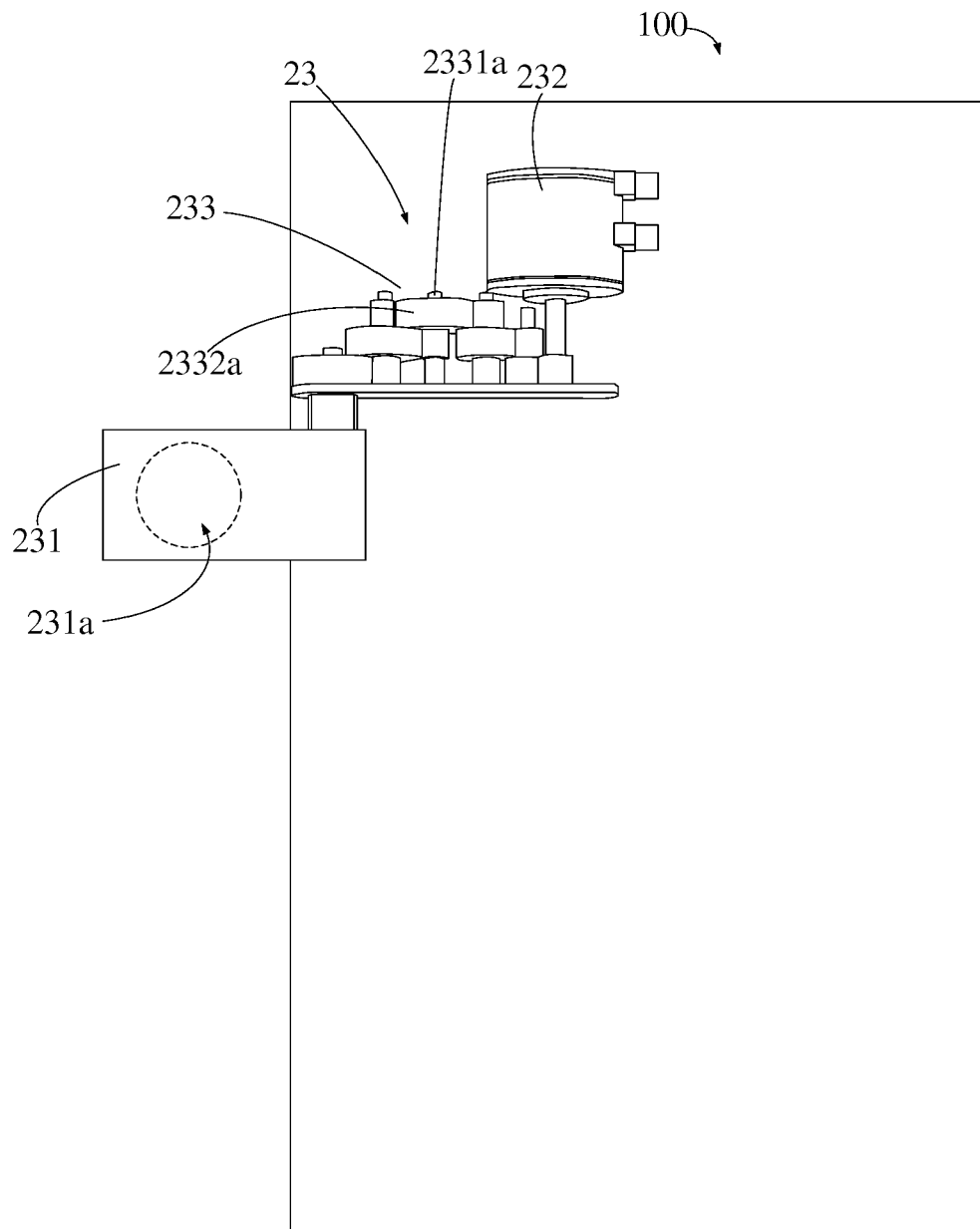


FIG. 10

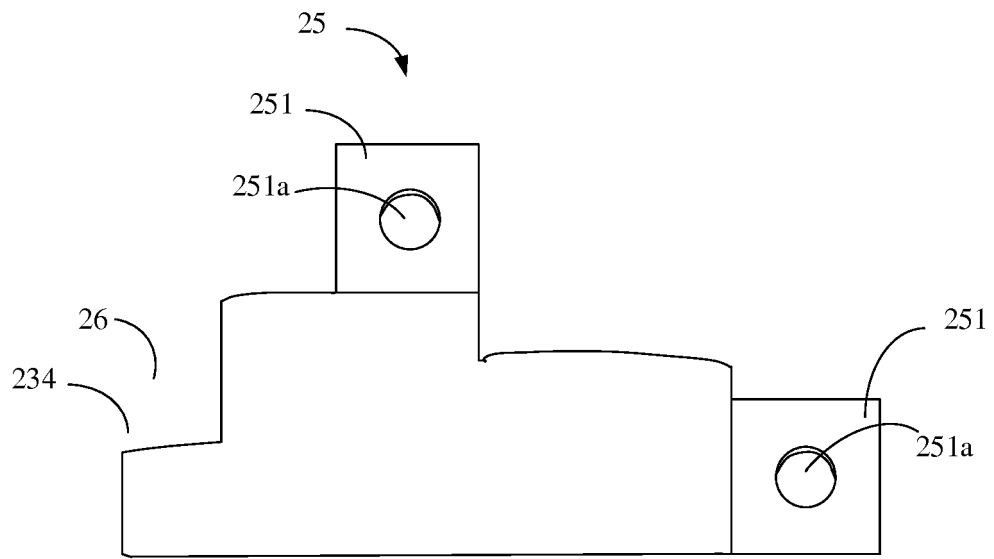


FIG. 11

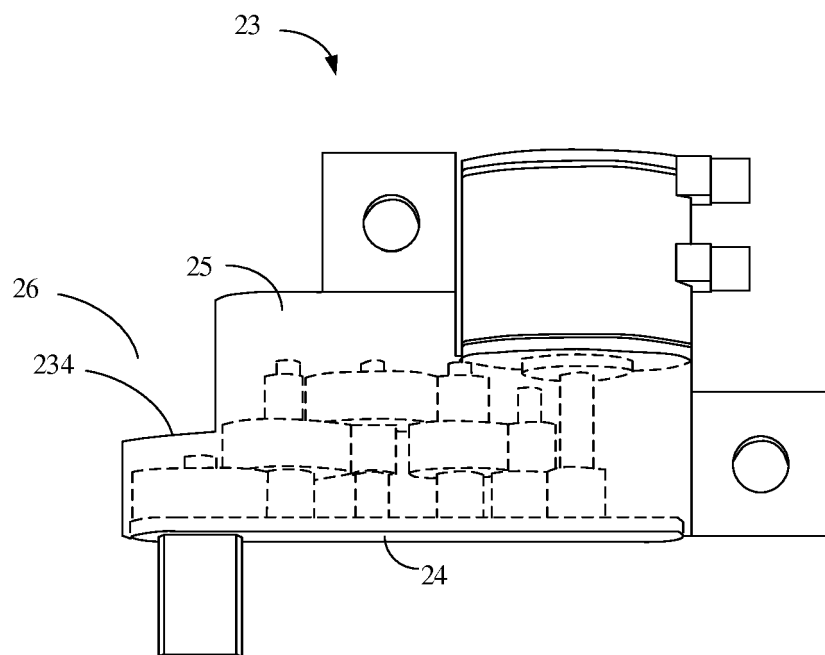


FIG. 12

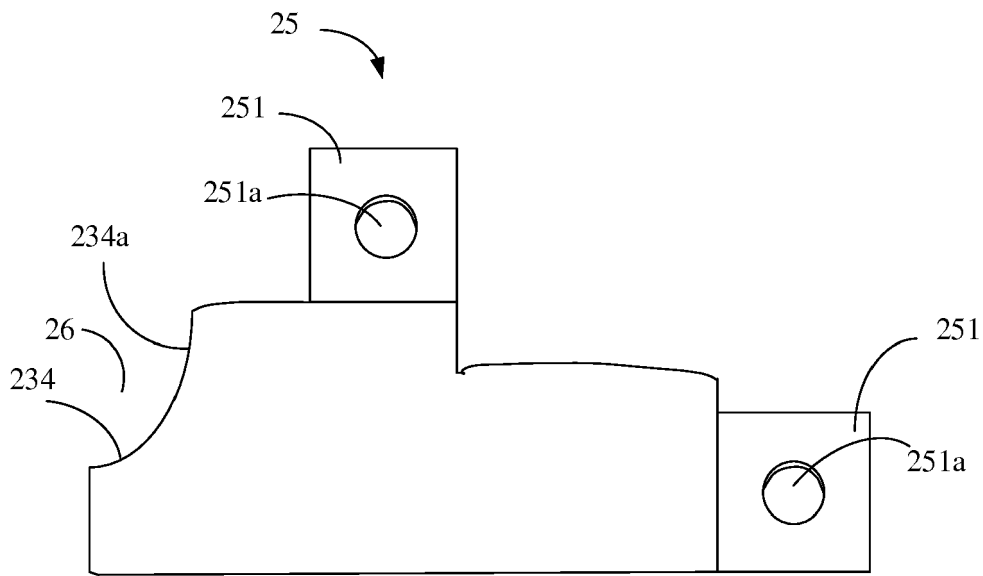


FIG. 13

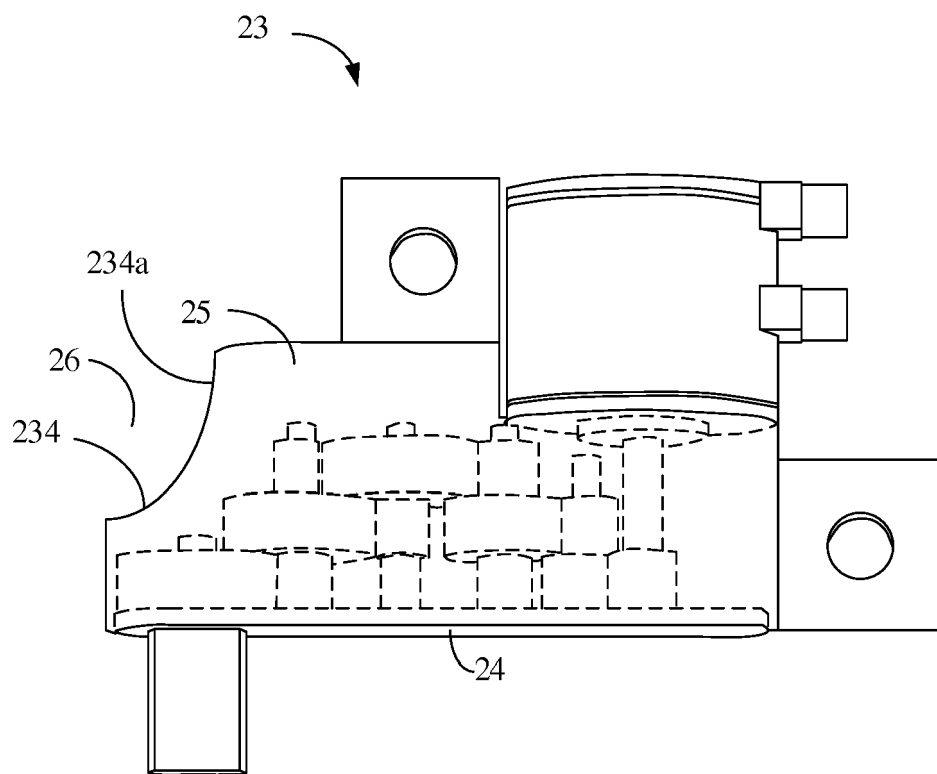


FIG. 14

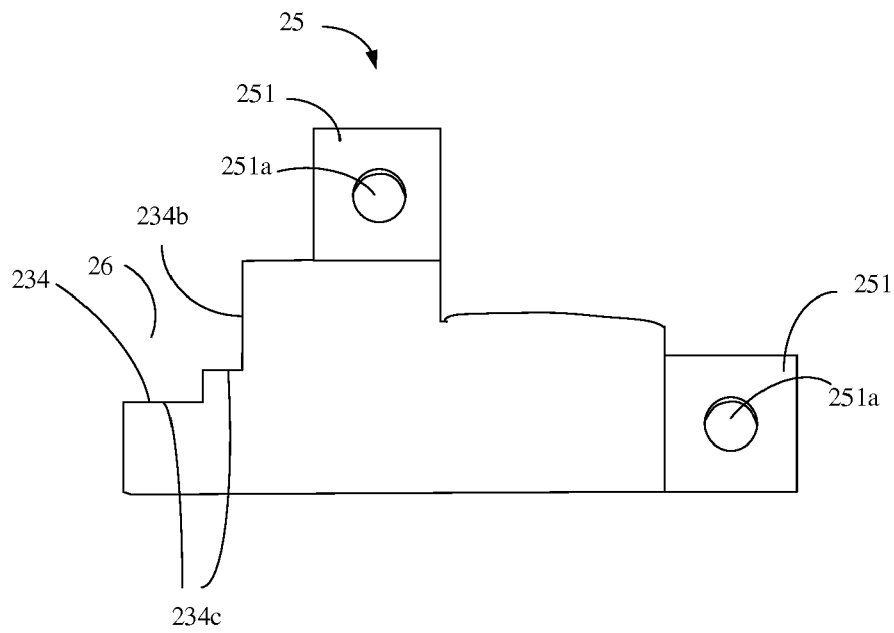


FIG. 15

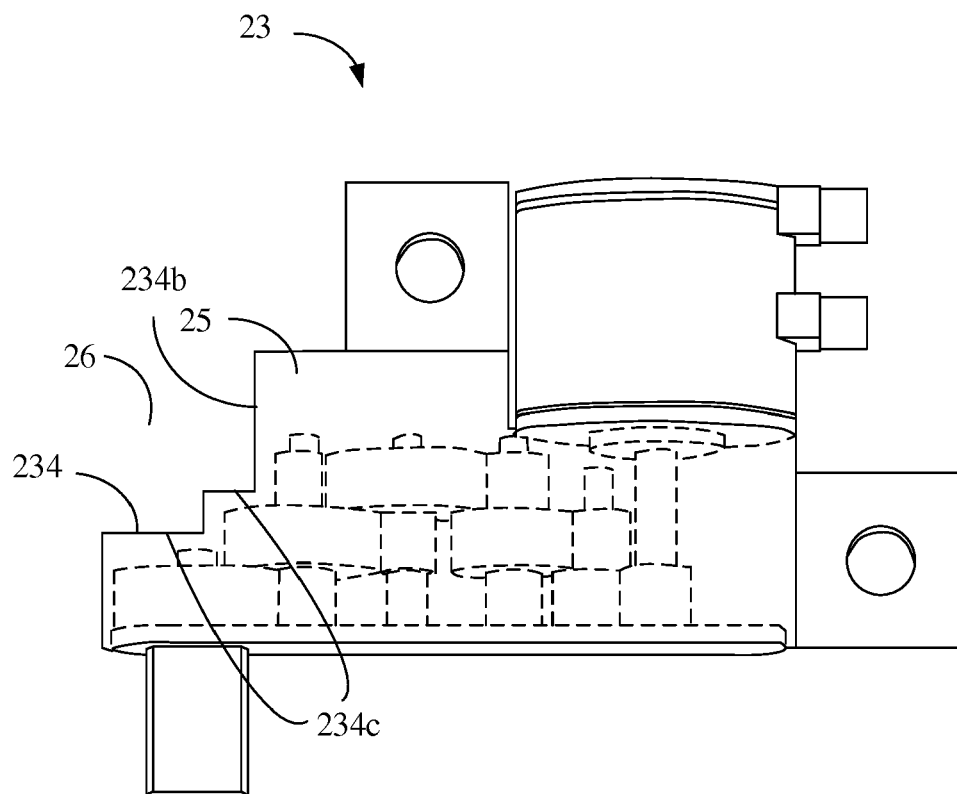


FIG. 16



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 8503

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2006/261248 A1 (HWANG JIN-CHYUAN [TW]) 23 November 2006 (2006-11-23)	1,3,11	INV. G03B17/00 H04N5/225
Y	* abstract *	15	
A	* paragraph [0002] - paragraph [0008] * * paragraph [0030] - paragraph [0033] * * figures 1-19 *	2,4-10, 12-14	

X	US 2006/261257 A1 (HWANG JIN-CHYUAN [TW]) 23 November 2006 (2006-11-23)	1,3, 11-14	
Y	* abstract *	15	
A	* paragraph [0026] - paragraph [0034] * * figures 1-15 *	2,4-10	

X	US 5 907 730 A (TSENG KOU-LONG [TW] ET AL) 25 May 1999 (1999-05-25)	1-3,11	
A	* abstract * * column 2, line 8 - line 65 * * figures 1,2 *	4-10, 12-15	

Y	US 2016/056530 A1 (LEE JONG-HYUCK [KR] ET AL) 25 February 2016 (2016-02-25)	15	
A	* abstract * * paragraph [0066] - paragraph [0067] * * paragraph [0091] *	1-14	TECHNICAL FIELDS SEARCHED (IPC)
	-----		G03D G03B H04N
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 May 2019	Examiner Schreib, Franz
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 18 20 8503

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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16-05-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006261248 A1	23-11-2006	JP 2006323372 A	30-11-2006
		KR 20060119756 A	24-11-2006
		TW 1260905 B	21-08-2006
		US 2006261248 A1	23-11-2006
US 2006261257 A1	23-11-2006	JP 2006325195 A	30-11-2006
		KR 20060119755 A	24-11-2006
		TW 1260906 B	21-08-2006
		US 2006261257 A1	23-11-2006
US 5907730 A	25-05-1999	AU 690512 B3	23-04-1998
		GB 2333847 A	04-08-1999
		US 5907730 A	25-05-1999
US 2016056530 A1	25-02-2016	KR 20160022074 A	29-02-2016
		US 2016056530 A1	25-02-2016